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Forced board changes: Evidence from Norway

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Forced board changes: Evidence from Norway

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Abstract

The recently introduced gender quota on Norwegian corporate boards dramatically increased the share of female directors. This reform offers a natural experiment to investigate changes in corporate governance from forced increases in gender diversity, and whether these changes in turn impact firm performance. I find that investors anticipate the new directors to be more effective in firms with less information asymmetry between insiders of the firm and outsiders. Firms with low information asymmetry experience positive and significant cumulative abnormal returns (CAR) at the introduction of the quota, whereas firms with high information asymmetry show negative but insignificant CAR.

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With the threat of forced liquidation for non-compliance, the Norwegian government mandated a quota of 40% female directors for public limited liability companies (PLC) in 2005. The average PLC board had 15.5% female directors at the time; and 40.7% three years later. Several other countries are implementing or considering similar measures to increase the number of female directors on company boards, e.g Belgium, Canada, Finland, France, Iceland, Italy, the Netherlands, Spain, and Sweden. What can regulators expect to achieve by imposing a quota on a particular director characteristic, such as gender?

The board of directors has the critical functions of monitoring and advising top management (Hermalin and Weisbach, 2003; Adams, Hermalin and Weisbach, 2010). There is evidence that firms compose their boards in close relation to firm characteristics, which determine the costs and benefits of the board's monitory and advisory roles (Coles, Daniel and Naveen, 2008; Linck, Netter and Yang, 2008). These findings suggest that a regulatory framework imposing uniform requirements on board composition, like the Norwegian gender quota, could be ill-conceived. Indeed, if firms compose their boards optimally (to maximize firm value conditional on firm characteristics), any regulatory imposed constraints on board composition can only reduce firm value.

However, if the CEO dislikes being monitored he will derive private benefits from a board dominated by directors more aligned with him than with shareholders, irrespective of firm characteristics. For instance, Hermalin and Weisbach (1998) show how a CEO through increased bargaining power can influence the board selection process, and thereby reduce the monitoring prowess of the board. This would generate friction in the selection of directors, and possibly lead to a gap between the optimal and the actual monitoring capabilities of the board.

In this paper I use the stock market reaction to the introduction of the Norwegian gender quota to elicit the expected impact of an increase in female directors on firm value, conditional on firm specific information asymmetry. This setup is motivated by recent research showing that female directors predominantly classify as outside directors[1], and that firm specific information asymmetry determines the effectiveness of an outside director

[1]Staubo (2010) classifies 83% of female directorships in Norway, compared to 50% of male directorships, as outside directors. Outside directors are defined as not current or former employees, not employees of closely related firms, not relatives of officers, and not persons with a business relation to the firm. Using a comparable definition, Adams and Ferreira (2009) classify 84% of US female directorships as outsiders.

(Raheja, 2005; Adams and Ferreira, 2007; Harris and Raviv, 2008; Duchin, Matsusaka and Ozbas, 2010). Thus, although outside or female directors are less aligned with the CEO, and should therefore be better monitors of the same CEO on behalf of shareholders, they are less likely to be effective in firms with high information asymmetry due to the information disadvantage they face in such firms. High information asymmetry firms with few female directors are therefore likely to be hurt by being forced to increase the share of female directors in order to comply with the gender quota. In contrast, an outside or female director is likely to be effective in a firm with low information asymmetry. If the firm nevertheless has few female directors, this could indicate that the board is constituted to minimize oversight. Low information asymmetry firms with few female directors before the introduction of the gender quota might therefore benefit from the forced increase in female directors, due to potentially sub-optimal monitoring pre-reform.

I measure the daily stock returns of firms listed on the Oslo Stock Exchange, relative to the return on the Morgan Stanley Capital International (MSCI) World Index, around 9^{th} December 2005 when the quota was mandated. In OLS regressions controlling for firm size, board size, and industry sector, I find that firms with low information asymmetry and few female directors experience positive and significant cumulative abnormal returns (CAR). In contrast, firms with high information asymmetry and few female directors show negative but insignificant CAR. Thus, the expected impact of the reform on firm value depends on firm specific information asymmetry, which is consistent with some firms having sub-optimal boards prior to the reform. Analysis of change in return on assets in listed firms from 2004 to 2008 offers evidence consistent with these results, and I do not find evidence of a selection bias whereby firms de-list in order to avoid the quota.

Ahern and Dittmar (2010) report that the same Norwegian gender quota generated younger and less experienced boards, which reduced firm value (Tobin Q). I find that these results may be driven by their particular sampling procedure that over-emphasizes new firms, with both younger directors and bigger fall in Tobin Q compared to older firms, rather than by the introduction of the gender quota. Moreover, they do not condition their analysis on firm specific information asymmetry, which I find to be important in explaining the impact of the reform.

The paper is organized as follows: Section 1 offers a background to the Norwegian gender quota, argues that this reform is a natural experiment to investigate forced increases in gender diversity on corporate boards, looks at the board selection process in Norway, and reviews the literature on outside directors and information asymmetry; section 2 presents the data sources used; section 3 analyses the stock market reaction to the introduction of the quota; section 4 looks at whether firms changed organizational form in order to avoid the quota and at how the quota impacted return on assets in affected firms; section 5 relates my findings to those in Ahern and Dittmar (2010); section 6 concludes.

1 Background and context

1.1 The quota

Under the new law, each gender must make up at least 40% of directors representing owners, with a less stringent quota for directors representing employees.[2] In this paper I therefore focus on the directors representing owners. The quota was mandated 9^{th} December 2005 and applies to all public limited liability companies (PLC); but not to limited liability companies (LTD). PLC ("Allmennaksjeselskap", ASA) is a separate organizational form designed for large companies with many shareholders and liquid stock, whereas the LTD organizational form is for small companies with few shareholder and less liquid stock (Woxholth, 2007). For instance, PLCs can do public offering of stock and list on the Oslo Stock Exchange, whereas a LTD can only do private placement. There are both listed and non-listed PLCs, and the quota applies equally to both groups. PLCs registered after 1^{st} January 2006 had to comply with the new regulation immediately, whereas existing PLCs had to comply by 1^{st} January 2008. The sanction for not meeting the quota is forced liquidation. In April 2008 the Norwegian Business Register ("Bronnoysund registrene")

[2]With 2 or 3 directors representing owners, each gender must be represented. For 4 or 5 directors, at least two directors for each gender. From 6 to 8 directors, at least 3 from each gender. For 9 directors, at least 4 from each gender. For 10 or more directors, at least 40% from each gender. In Norway, employees in companies above a certain size are entitled to their own directors on the company board, elected by and from the workforce. Up to one third of directors may be such employee representatives, and a separate gender quota applies to these directors: For 2 or more directors representing employees, each gender must be represented, but not if the workforce is dominated (more than 80%) by one gender. Many directors representing the employees are union representatives (Hagen, 2008).

announced that all PLCs were in compliance, and no firm was forced to liquidate for failing to meet the quota.

Overall compliance from 2008 onwards is confirmed in Table 1, which reports director characteristics in all PLCs from 1999 to 2009. In 2008 and 2009 around 2% of PLCs did not strictly comply with the quota, which is likely due to temporary fluctuations in board composition. Overall compliance was accomplished without overloading the typical female director, as the average number of PLC directorships per female director remains stable over the period at around 1.2. Nor was the increased demand for female directors met by disproportionate recruitment of directors from outside Norway. From 2003 through to 2009, foreigners as a share of female directors is largely unchanged at around 12%, and always below the share of foreigners among male directors, which was 15% in 2009. Female directors are on average somewhat younger than male directors, and the introduction of the quota does not seem to have widened the age gap by much. In 2005, the average female director was 45 years old, compared to 51 for the average male director. By 2008, the average female director was one year older; the average male director was only two years older than in 2005.

1.2 A natural experiment

The new law investigated in this paper deals only and specifically with gender representation on corporate boards. The government claimed that the low share of women on corporate boards was due to traditional ideologies and cultural aspects, which resulted in women not being considered for these posts. It therefore found it necessary to intervene in order to arrange for a societal development that acknowledged and made use of both genders' competences (Ministry of Children, Family and Equality, 2003). Thus, the introduction of the quota was exogenous to firm performance measures.

A gender quota on corporate boards was first suggested in 1999, and a conditional law amendment on the quota passed the Norwegian Parliament in 2003. However, the government continued to encourage voluntary compliance before surprisingly mandating the quota in December 2005 with the sanction of forced liquidation. See the appendix for a full account of the legislative process. Following a favorable vote in the Norwegian Parliament, a

law proposal needs a sanction and a mandate to become binding law. Both these additional steps are taken by the government, and usually immediately following the vote in the Parliament. However, neither of these steps were taken in the case of the gender quota in 2003. This was because the law contained a "self-destruct" clause: If firms voluntarily complied with the quota by mid-2005, the law would not be mandated. Therefore, there was uncertainty about whether the law would ever be binding. Moreover, there was no specific sanction associated with the law until the day it was mandated. The government surprisingly opted for forced liquidation as the sanction for non-compliance. Just a few days before the law was mandated, the Prime Minister had said in a public statement that if the quota was to become binding law the sanction for non-compliance would most likely be a fine ("Verdens Gang", Norway's largest daily newspaper, 1^{st} December 2005). Finally, the law proposal specified that if the law was mandated, firms would have two years to recruit the required female directors.

Thus, a firm that, for whatever reason, resisted female directors is unlikely to have changed their director selection procedures before December 2005, when they were forced to do so by law. Table 1 shows that a full 79.9% of firms were not in compliance with the law at the end of 2005, and the reform had a massive impact on board composition thereafter. The average PLC board had 15.5% female directors in 2005, compared to 40.7% in 2008. The share of female directors on Norwegian PLC boards prior to the introduction of the gender quota is similar to other comparable countries. Adams and Ferreira (2009) report 14.8% female directors in Fortune 500 firms in the US, 8.7% in Australia, 10.6% in Canada and 8.0% in Europe (based on various data sources from 2004 to 2007).

1.3 The selection of directors in Norway

In this section I argue that there is room for the CEO to express personal preferences in the selection of directors in Norwegian PLCs, at least prior to the reform, and that these preferences could have substantial influence over the selection process. This potential friction is important because it may have generated sub-optimal board structures, to the extent that the CEO derives personal benefits from being monitored less. In fact, Norwegian firms ranked next to last out of 14 European countries in a corporate governance ranking

from 2001 ("Okonomisk rapport" 21/2001), just above Portugal. The review highlights that Norwegian boards use independent sub-committees to a very limited extent, and they do not communicate enough information to shareholders.

Norwegian corporate law does not regulate how candidates are nominated for election to the board. It is nevertheless common for firms to have a nomination committee elected at the shareholders' annual meeting. Following communication with management, the current board and large shareholders, the nominating committee proposes the list of candidates, which is then voted on at the shareholders' annual meeting. In an exhaustive study of Norwegian ownership structure on the Oslo Stock Exchange, Bohren and Odegaard (2006) conclude that Norwegian firms have remarkably low concentration of ownership relative to comparable countries. The lack of large shareholders could increase the CEO's relative influence on the director nomination process. Moreover, an analysis of all firms listed on the Oslo Stock Exchange in 2005 found that 60% of firms offered no or very limited information about the nomination committee (Nymark and Thaysen, 2006). This seeming lack of transparency could arguably augment the influence of the CEO in the nominating process. Finally, most large Norwegian firms have a corporate assembly ("Bedriftsforsamling"), in which case the vote on directors is done there rather than at the shareholders' annual meeting. Such a setup would further distance the election of directors from direct shareholder scrutiny.

The personal preferences of the CEO likely have less to do with direct discrimination of women, and more to do with CEOs selecting people in their informal networks (Becker, 1971). If informal networks are important for director recruitment, and women are generally outside such networks, then the result would be fewer female directors. Indeed, in a survey of Norwegian male business leaders prior to the reform, 66% of the respondents say that women do not participate in the "forums" where recruitment to boards take place (NHO, 2003). A survey of PLC directors done prior to the reform reports that male directors were five times more likely than female directors to cite informal networks as the primary vehicle for their recruitment to the board (ECON, 2003).

Thus, there seems to be room for the CEO's personal preferences to influence the selection of directors in Norwegian PLCs, at least prior to the reform. To the extent

that the CEO derives personal benefits from being monitored less, this would constitute a potential friction that could generate sub-optimal board structures.

1.4 Outside directors and information asymmetry

Outside directors, largely independent from the CEO, should be in a better position to monitor the same CEO on behalf of shareholders (Fama and Jensen, 1983). Rosenstein and Wyatt (1990) and Nguyen and Nielsen (2010) show that shareholders value the very independence of an outside director, over and above the individual skills and competence of that director. Nevertheless, shareholders may not always prefer a board dominated by outside directors. The board of directors has two primary roles: monitoring and advising (Hermalin and Weisbach, 2003; Adams et al., 2010). A new strand of research argues that the effectiveness of outside directors in performing both these roles is constrained by their access to information (Raheja, 2005; Adams and Ferreira, 2007; Harris and Raviv, 2008; Duchin et al., 2010). Although outside directors are privy to non-public information about the company, outside directors are at an informational disadvantage relative to insiders of the firm.

Such information asymmetries have long been acknowledged in economics. For instance, Myers and Majluf (1984) point out that the informational advantage of firm insiders goes beyond proprietary information. Insiders know better what the proprietary information means for the firm. They have an insider's view of the organization and what it can and cannot do. This organizational knowledge it is part of the insiders' human capital; acquired by conscious effort and through trial and error. Educating outsiders takes time and money. Thus, there is an inherent informational asymmetry between insiders of the firm and outsiders, specific to each firm, which makes it costly or time consuming for an outside director to access and evaluate information about the firm. Indeed, Ravina and Sapienza (2010) find that both outside and inside directors earn abnormal profits when trading in their companies' stocks, but inside directors earn better returns than outside directors.

Thus, the effectiveness of an outside director depends on the degree of information asymmetry between insiders of the firm and outsiders. With less information asymmetry,

it is easier for an outside director to transform her general expertise to a specific firm and become an effective director. Based on this information asymmetry, therefore, some firms would optimally choose to have an insider dominated board, and others an outsider dominated board.

If firms compose their boards optimally according to the information asymmetry between insiders of the firm and outsiders, then any regulatory imposed increase in the share of outside directors can only reduce firm value. However, if the CEO dislikes being monitored he will derive private benefits from a board dominated by directors more aligned with him than with shareholders, irrespective of the firm specific information asymmetry. This would generate friction in the selection of directors, and possibly lead to a gap between the optimal and the actual share of outside directors. This friction would be particularly detrimental to a low information asymmetry firm; less so for a high information asymmetry firm, which optimally has more inside directors. If a firm with low information asymmetry has very few outside directors due to this friction, a reform that increases the share of outside directors, for instance by increasing the share of female directors, will increase firm value. On the other hand, a firm with high information asymmetry could decrease in value from the same reform.

Duchin et al. (2010) show that the impact on firm performance of the exogenous increase in outside directors generated by the US Sarbannes-Oxley Act (SOX) of 2002 depends on firm specific information asymmetry.[3] They find that outside directors improve firm performance when information asymmetry is low, and hurt performance when information asymmetry is high. This evidence is consistent with high information asymmetry firms already having constituted their board optimally with many inside directors, and that the legislated increase in outside directors was harmful to these firms. On the other hand, low information asymmetry firms had constituted their boards with few outsiders to minimize

[3]SOX defines an outside director as a person who does not accept any fee from the appointing firm (other than as director) and is not an affiliated person of the firm or any subsidiary. It requires that all members of corporate audit commitees are outside directors. SOX generated changes in the regulations of the NYSE and Nasdaq stock exchanges in 2003, beyond that required by SOX. The NYSE defines an outside director as a person who has no material relationship with the company; a majority of directors, and all members of the compensation and nominating committees must be outsiders. The Nasdaq defines an outsider as a person who does not have a relationship with the company that would interfere with independent judgment; a majority on the board, and the compensation and nominating committees, must be outsiders.

oversight, and the increase in outside directors was therefore helpful in these firms.

Recent research from Norway, Sweden and the US suggests that female directors differ from male directors; they are more likely to align with shareholders (Staubo, 2010; Adams and Funk, 2010; Adams and Ferreira, 2009). The reasons pointed to are institutional arrangements, e.g. women are less likely to be members of the "old boys club", and that women tend to be more universally concerned than men. As such, an increase in the share of female directors is equivalent to an increase in the share of outside directors. The impact on firm performance of the exogenous increase in female directors generated by the Norwegian gender quota should therefore depend on firm specific information asymmetry. This relation is what I set out to test in this paper.

2 Data sources

Data on board composition for all Norwegian PLCs is compiled by the Norwegian Business Register ("Bronnoysundregistrene"). The dataset covers all board members in all PLCs (listed and non-listed) registered each year from 1999 to 2009, and includes the background information that firms are required by law to report: name, age, gender, and nationality. This data was presented in Table 1. Also from the Norwegian Business Register, I have aggregate board composition data for each PLC at the monthly frequency up to March 2008. Daily Oslo Stock Exchange (OSE) stock prices, including split/reverse split and dividend adjustments, and index data are from the Stock Exchange database at the Norwegian School of Economics and Business Administration (NHH). I collect daily series of the MSCI World Index from Thomson Reuters Datastream, and NOK/USD exchange rate data from the Norwegian Central Bank. Accounting data and business sector information up to 2008 are from the NHH database constructed by Mjos and Oksnes (2010).

My measure of information asymmetry is based on a survey of all Norwegian listed firms done by the auditing firm PricewaterhouseCoopers (PWC) in 2005 on behalf of the OSE. In preparation for a corporate governance initiative, the OSE wanted to gauge how much information each firm revealed about its governance structure through public information. Thus, the PWC survey measures the quality and availability of public information on the governance structure in each firm, and not a firm's relative compliance with a code of

practice. PWC evaluated each firm listed on the OSE, placing a score from 0 to 3 on each of 14 dimensions[4] for a maximum total information score of 42 points for each firm. A score of zero indicates that there was no information on a particular dimension. A score of one indicates very limited information; two points average information; and three points adequate information. The lesser quality and availability of information about a firm, the higher is the information asymmetry between insiders of the firm and outsiders. I normalize the information score of each firm by the maximum score to get an information index from zero to one. Thus, for each firm i

$$\text{Information index}_i = \frac{\text{Total information score}_i}{42} \tag{1}$$

Figure 1 provides a histogram of the information index for all firms. We observe a rather even distribution, with a mean (and median) value of 0.4. Some firms have an information index of zero. This means that efforts to locate relevant public information on these firms were unsuccessful along all the 14 dimensions.

3 The impact of the reform on firm value

The announcement on 9^{th} December 2005 that the quota would be mandated, with the threat of forced liquidation, came as a surprise. To the extent that the ensuing influx of female directors was relevant for the valuation of the firms, investors would right away incorporate into the stock price the expected net present value of the costs and benefits of the quota for each particular firm. Work on the new law started before it was mandated. If the effects of the quota were already anticipated and therefore partly included in prices, the events on 9^{th} December 2005 removed all uncertainty about whether the quota would be made binding law, and to the surprise of the market added the sanction of forced liquidation for non-compliance. Any residual price effects generated by the introduction of the quota would therefore be captured on this date. To examine if there were any valuation effects of

[4]Implementation and reporting on corporate governance; Business, objectives and strategies; Equity, dividend policy and capital increase; Equal treatment of shareholders and transactions with close associates; Freely negotiable shares; General meetings; Nomination committee; Corporate assembly and board of directors: composition and independence; The work of the board of directors; Renumeration of the board of directors; Renumeration of the executive personnel; Information and communications; Take-overs; Auditor.

the quota, I estimate the abnormal announcement stock returns for the firms on the Oslo Stock Exchange (OSE) around 9^{th} December 2005.

I estimate the abnormal return for firm i on day t as $AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt})$, where R_{it} is the return on the stock of firm i on day t; R_{mt} is the return on the MSCI World Index; and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the coefficients estimated from the single-factor market model $R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$ over the days -255 to -6.[5] To account for the possibility of information overflow before the announcement, and underreaction on the announcement day, I calculate the cumulative abnormal return for five different return windows: $(-1, +1)$, $(-2, +2)$, $(-3, +3)$, $(-4, +4)$, and $(-5, +5)$, all centered on 9^{th} December 2005. The cumulative abnormal return (CAR) for a window that starts at day $-k$ and ends at day $+k$ is $CAR_i(-k, +k) = \sum_{t=-k}^{k} AR_{it}$.

I first calculate the simple average CAR for all firms, in addition to four subgroups based on firm specific information asymmetry and the pre-announcement share of female directors. Table 2 shows the results. From Panel A we see that the average OSE firm experienced positive abnormal returns on the introduction of the gender quota. For all the five return windows, ACAR is significantly positive. Panel B shows the results for the firms with low information asymmetry and few female directors. Across all the five investigated windows, ACAR is significantly positive for this group. Firms with low information asymmetry and many female directors would not be much affected by the new law, and Panel C reveals that the measured ACAR for these firms is not significant. Panels D and E relate the results for firms with high information asymmetry. For some of the return windows investigated, ACAR is significantly positive. Overall, the results support the conjecture that the forced increase in gender diversity added value to firms with low information asymmetry.

[5]Results are similar when I use the OSE All Share Index (OSEAX) or the OSE Benchmark Index (OSEBX) instead of the MSCI World Index. OSEAX includes all shares listed on OSE; OSEBX the most traded shares. Both indices are value weighted and adjusted for dividend payments. The MSCI index includes a large collection of stocks from all the developed markets in the world. I use the price index in US Dollars, which is adjusted for dividends. I then convert the MSCI index to NOK using the NOK/USD daily exchange rate.

3.1 CAR controlling for sector and size

To specifically test the relation between an increase in the share of female directors and firm value conditional on information asymmetry, I want to control for possible sector-wide shocks and firms size. I therefore perform OLS regressions of CAR, separately for low and high information asymmetry firms, on an indicator variable that equals 1 if the firm has less than the median share of female directors in November 2005. This dummy captures the valuation impact on the firms most affected by the quota.[6] I also include controls for the logarithm of the market value of equity, the total number of directors, and industry sector indicator variables. Table 3 gives the results. In the low information asymmetry group (panel A), firms with relatively few female directors experience strong and positive abnormal returns over each of the return windows. This means that investors expected the impact of the reform in these firms to be positive. In panel B, where I look at high information asymmetry firms, the coefficient estimate on the dummy variable for few female directors is negative, but not significant in either of the return windows. Thus, the impact on firms affected by the Norwegian gender quota seems to depend on the information asymmetry between insiders of the firm and outsiders, as expected. This result suggests that an increase in female directors is tantamount to an increase in outside directors, which is valuable only for certain firms.

4 Robustness

4.1 Conversion from PLC to LTD

After the gender quota was mandated, there was a subsequent drop in the number of PLCs. It is possible that firms hurt by the forced change of board members chose to instead take the LTD corporate form, and thus avoid being subject to the reform. The last row in Table 1 shows that the number of PLCs dropped each year from 2006 to 2009: from 505 firms down to 360; a drop of 28.7%. In this section, I investigate the potential selection issue

[6]Results are similar when this dummy instead equals one if the firm needs more than the median percentage or absolute number of women to meet the quota, else zero. F-tests show that, in each of the five windows, the explanatory variables have different impacts on the two sub-samples low and high information asymmetry firms.

associated with this decline in the number of PLCs.

A non-listed PLC could easily convert to LTD, while a listed PLC would first have to delist from the OSE, and then convert to LTD in order to avoid the quota. Moverover, a non-listed PLC is likely to exhibit higher information asymmetry between insiders of the firm and outsiders compared to a listed firm, as there is less public information available than for listed firms. As highlighted in Section 1.4, a firm with high information asymmetry is likely to optimally resist outside directors. Therefore, to the extent that firms converted from PLC to LTD in order to avoid the gender quota, I expect this issue to be particularly relevant for non-listed PLCs.

Figure 2 shows the rate of conversion from PLC to LTD separately for listed and non-listed PLCs from 1999 to 2008. The conversion rate is always higher for non-listed PLCs, and there is a peak in 2006, the year after the quota was mandated. Table 4 reports on the firm characteristics over the same years, separately for listed and non-listed PLCs. On average, listed PLCs are less likely to convert; have a higher share of female directors; have bigger boards; are older; are more likely to have directors representing employees; and have higher book asset values. The mean values are significantly different between the two groups for all these variables ($p < 0.01$). Non-listed PLCs have slightly higher equity ratio compared to listed PLCs, and the return on assets is not significantly different between the two groups. See Table 4 for variable definitions.

To test whether the conversion rate is associated with the quota, I investigate whether converting firms systematically had few female directors. To do this I perform OLS regressions each year from 1999 to 2008 of the conversion decision on the share of female directors the same year, controlling for firm characteristics. This constitutes a test of the conditional correlation between the conversion decision and the share of female directors at the time of the conversion decision.

Table 5 and Table 6 show the results for listed and non-listed PLCs, respectively. We observe that there is no correlation between the conversion decision and the share of female directors for listed firms. This indicates that the stock price reaction I report in this paper does not suffer from a selection bias caused by firms delisting subsequent to the introduction of the quota in order to avoid the quota. For non-listed PLCs, however, there is a strong

negative correlation between the conversion decision and the share female directors in both 2006 and 2007. This corresponds well with the legislative process of the quota outlined in Section 1, whereby the quota only had an impact after it was mandated in December 2005.

4.2 Return on assets

The stock market reaction suggests that investors expected the quota to impact firm performance differently depending on firm specific information asymmetry. In this subsection I investigate whether this result is corroborated by changes in return on assets in the affected firms. In investigating the effect of the quota on firm performance, I am interested specifically in firm performance from 2004 to 2008. The quota was mandated towards the end of 2005, and 1st January 2008 was the final deadline to have the new women physically on the board. Thus, 2008 was the first year that all affected firms were in compliance, and I start the analysis one year before the law was introduced.

Reminiscent of the setup in Duchin et al. (2010), my empirical model assumes that firm performance is determined by the following relation:

$$ROA_{it} = \beta_1 F_{it} + \beta_2 F_{it} I_i + \beta_3 I_i + \cdots + \gamma X_i + \lambda S_t + \epsilon_{it}, \tag{2}$$

where i indexes a firm, t indexes a year, ROA is return on assets, F is the share of female directors, I is the information index score, X holds other firm specific effects, and S is time specific effects (captured by year dummies). This relation assumes that performance and the share of female directors vary over time, and that the information index does not vary over time. The setup allows for the marginal effect of female directors on performance to depend on information asymmetry, which is a firm specific effect: $\partial ROA/\partial F = \beta_1 + \beta_2 I$. Instead of estimating equation (2), I estimate the first difference relation:

$$\triangle ROA_i = \beta_1 \triangle F_i + \beta_2 (\triangle F_i \times I_i) + \cdots + \lambda \triangle S + \triangle \epsilon_i, \tag{3}$$

where $\triangle Z \equiv Z_{2008} - Z_{2004}$. This removes the firm-specific effects, the time-specific effects are reduced to a constant, and the information index remains only in the interaction term. In the regressions I also add the following control variables: board size, equity ratio, firm

age, indicator variable for employee representative on the board, total assets, market value of equity, and Tobin Q. All these control variables are from 2004, and thus account for the initial conditions. Norway transitioned from domestic GAAP (Generally Accepted Accounting Principles) to IFRS (International Financial Reporting Standards) in 2005. Beisland and Knivsflaa (2010) find that IFRS represents a less conservative accounting framework than the Norwegian GAAP, which could lead to an increase in listed firms' book value of assets from 2005 with an associated reduction in ROA even with unchanged earnings. This transition would impact all firms, but there might also be sector specific variation in how firm respond to these rule changes. I therefore include industry-sector indicator variables in all the regressions.

Following Duchin et al. (2010), I perform an "instrumented approach". In this setup I first regress the change in the share of female directors on a dummy variable that is equal to one if the firm did not comply with the quota in 2004, in addition to the control variables. Then I take the predicted changes in the share of female directors from this regression, in place of the actual change, to estimate equation (3).

The results are reported in Table 7: Column 1 shows the results from the first stage of the instrumented approach, and Column 2 and Column 3 the results from the second stage regression without and with the information index interaction term. From Column 1, we see that whether the firm was compliant with the quota in 2004 is a strong predictor of changes in the share of female directors, making compliance in 2004 a useful instrument for future changes in the share of female directors. Column 2 shows that the coefficient estimate on predicted change in the share of female directors is close to zero and insignificant (p-value = 0.780). In Column 3, where I include the information index interaction term, the coefficient estimate on change in share of female directors is now negative and becomes bigger in absolute terms, but is not significantly different from zero at standard significance levels (p-value = 0.366). The coefficient estimate on the information index interaction term is positive and significant at the 10% level (p-value = 0.087). This means that among firms that had to increase the share of female directors to comply with the quota, the firms with low information asymmetry (i.e. high information index score) benefited more from the change than high information asymmetry firms did. Although the coefficient on the change

in share of female directors is not significant at standard significance levels, the size of the coefficient is large enough that it would partly off-set the positive effect from the interaction term, and even generate a negative impact on high information asymmetry firms.[7] These results are consistent with the stock market reaction presented in this paper, whereby the impact of the quota on firm performance depends on firm specific information asymmetry.

5 Comparison with Ahern and Dittmar (2010)

Ahern and Dittmar (2010) investigate the same Norwegian gender quota and report somewhat different results from those presented here. In this section I relate their findings to mine. I find that their particular sampling procedure seems to account for their results. Moreover, they do not condition their analysis on firm specific information asymmetry, which I find to be important in explaining the impact of the reform.

Ahern and Dittmar (2010) undertake the huge taks of hand collecting background information on directors in Norwegian firms listed in 2007. They collect this information on these firms from 2001 to 2008, which of course introduces a sampling bias in years other than 2007. If more than half a firm's board has missing data they drop the firm-year observation. They thereby construct one of the most comprehensive databases used for academic research on directors in a single country. My dataset on board members, presented in Table 1, is constructed by the Norwegian Business Register and contains all board members in all PLCs (listed and non-listed) registered each year from 1999 to 2009, but includes only the background information that firms are required to report by law: name, age, gender, and nationality.

Ahern and Dittmar (2010) first investigate the stock market reaction to the quota on 22^{nd} February 2002, and find a reduction in the market value of the OSE firms in their sample. On that day, the Minister of Trade and Industry supported the idea of a quota in a newspaper interview. However, all work on the law, both prior and subsequent to this date,

[7] To see this, consider a firm that increases the share of female directors by 25%, which is around the average increase for non-compliant firms. The change in ROA would depend on the information index: $\triangle ROA_i = -0.242 * 0.25 + 0.595 * 0.25 * I_i$. Thus, $\triangle ROA_i = 0$ for $I_i \approx 0.41$, which is close to the average value of the information index. For higher values of I_i (i.e. low information asymmetry firms) $\triangle ROA_i$ is positive; for lower values of I_i (i.e. high information asymmetry firms) $\triangle ROA_i$ is negative.

is done by the Ministry of Children, Family and Equality; not Trade and Industry. This date is therefore not highlighted in the appendix on the legislative process of the new law. In addition, their sampling procedure forces them to investigate the stock market reaction in 2002 only on firms that were also listed in 2007. Their regressions include 47 firms, less than one third the number of firms included in my analysis. Moreover, they do not control for firm specific variation in exposure to market risk or industry sector effects, which I do in the tests presented here. It is therefore not clear that the negative stock market reaction reported by Ahern and Dittmar (2010) was generated by the gender quota.

Next, Ahern and Dittmar (2010) find that young directors with less experience is associated with reduced market value (Tobin's Q). They argue that this is a result of the gender quota. However, their sampling bias in years other than 2007 generates an emphasis on new firms in their analysis, which could account for this result. The law was effective from 1^{st} January 2006, and firms established after this date would have to comply immediately whereas already established firms had two years to comply. Not only would new firms have to comply to the gender quota right away, they also likely attract younger directors. In unreported work, I identify 87 new PLCs registered in 2006 (of which 15 were listed), and 94 new PLCs in 2007 (of which 24 were listed). These 39 new listed firms would constitute more than half the firms that enter the analysis of Tobin Q and board member characteristics in Ahern and Dittmar (2010). Both male and female directors in these new firms are significantly younger than the directors in already existing firms. Moreover, these new firms experience a significantly bigger reduction in Tobin Q up to 2008 than did the firms established before 2006. Thus, the relation between young directors with less experience and lower Tobin's Q reported by Ahern and Dittmar (2010) could be an artifact of their sampling procedure that over-emphasizes new firms, rather than a result from the introduction of the gender quota.

6 Conclusion

The gender quota on Norwegian corporate boards dramatically increased the share of female directors. I find that the impact of the reform on firm value depends on the firm specific information asymmetry between insiders of the firm and outsiders. This result

points to several conclusions. First, an increase in female directors is tantamount to an increase in outside directors. With less information asymmetry, it is easier for an outside or female director to transform her general expertise to a specific firm and become an effective director. Second, some firms had sub-optimal governance structure before the introduction of the quota, and the increased monitoring with more female directors on the board was beneficial for these firms. I also find suggestive evidence that high information asymmetry firms were hurt by the same reform, as they would have had to alter an already optimal governance structure to comply with the quota. Though the evidence of a negative impact from the Norwegian gender quota is mostly insignificant at standard levels of statistical significance, it does offer caution to regulators who think there are only benefits to forced gender diversity on corporate boards.

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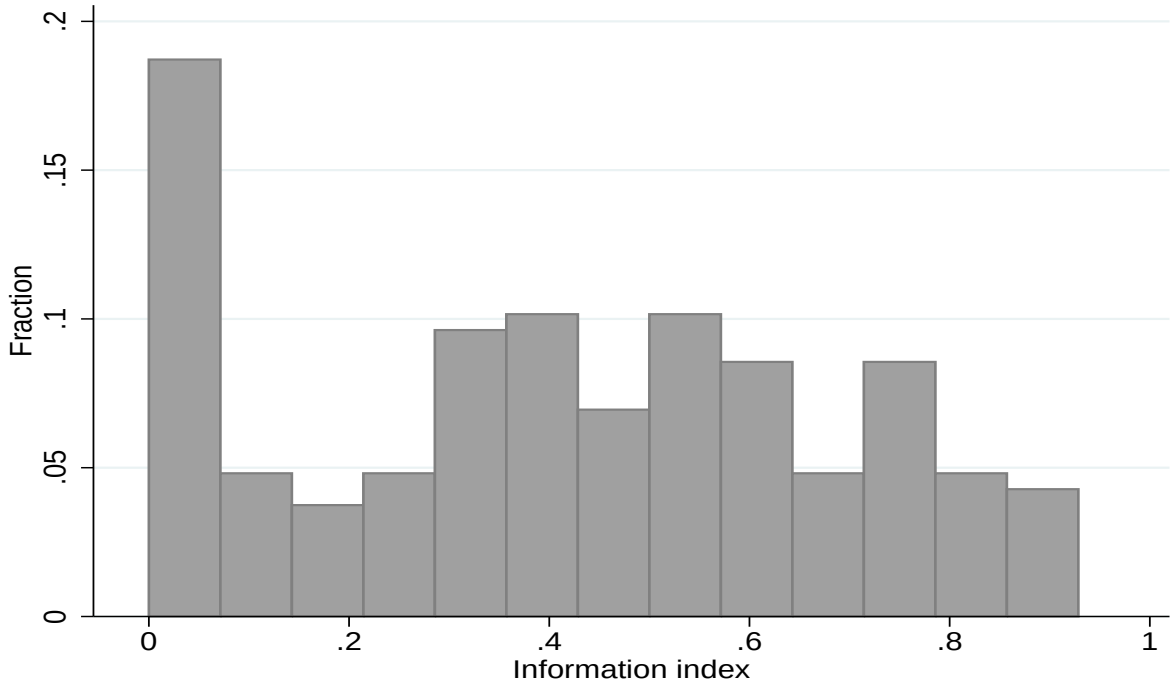
Appendix: The legislative process

- **October 1999**: The first public hearing on gender representation in private company boards. The government sent out a proposal to overhaul of the entire gender equality act from 1978. Among other things gender representation on boards. The 1978 law specified a minimum of 40% of both genders on committees appointed by a public body. This hearing suggested four possible extensions of the quota: (1) wholly government owned enterprises, (2) partly government owned enterprises, (3) businesses listed on the Oslo Stock Exchange, (4) boards generally (including LTD and foundations). The proposal intended for this to be covered by gender equality law, not corporate law. Several different alternatives as to how to implement the new law were discussed. The hearing includes the following suggestion for new law: "On the boards of all listed firms both genders must be represented. For boards with 4 or more members, each gender shall be represented by at least 25%."
- **July 2001**: Second public hearing. The government takes out gender representation on boards as a separate issue from the overhaul of the gender equality law. The proposal suggests that the quota is incorporated into corporate law instead of the gender equality law; now with a higher 40% target. The proposal presented three models: (1) quota for government owned firms only, (2) also PLCs, i.e. listed firms and non-listed PLCs, (3) no quota but instead a demand for gender representation in the nomination process for board election.
- 8^{th} **March 2002**: The government announce that they will continue the work towards a law proposal. They explicitly state that they invite cooperation with the private sector for a voluntary increase in female representation, rather than making a quota mandatory through law.
- **April 2003**: In relation with the public hearings on the issue, both the business community and the government initiated several programmes to increase the share of women on boards, and also to specifically increase skills for prospective board members. An online database was also established ("Kvinnebasen"), where women interested in board membership could register. As of April 2003 this database held 3,500 women (Ministry of Children, Family and Equality, 2003).
- 13^{th} **June 2003**: The law proposal is presented. It covers goverment owned companies and all PLCs, with a quota of 40%. Importantly, it includes a voluntary compliance deadline, which is set to 1^{th} July 2005. If firms meet the required ratio by that date, the law will not be mandated, i.e. it will be stricken from existence.
- 27^{th} **November 2003**: The law passes Parliament's lower chamber ("Odelstinget") with broad majority.
- 9^{th} **December 2003**: The law passes Parliament's upper chamber ("Lagtinget") without comments.
- 19^{th} **December 2003**: The law is formally included into Norwegian corporate law, though still under the condition that voluntary compliance by 1^{st} July 2005 would completely void the law. The law does not have a sanction or a mandate, i.e. it is not binding.

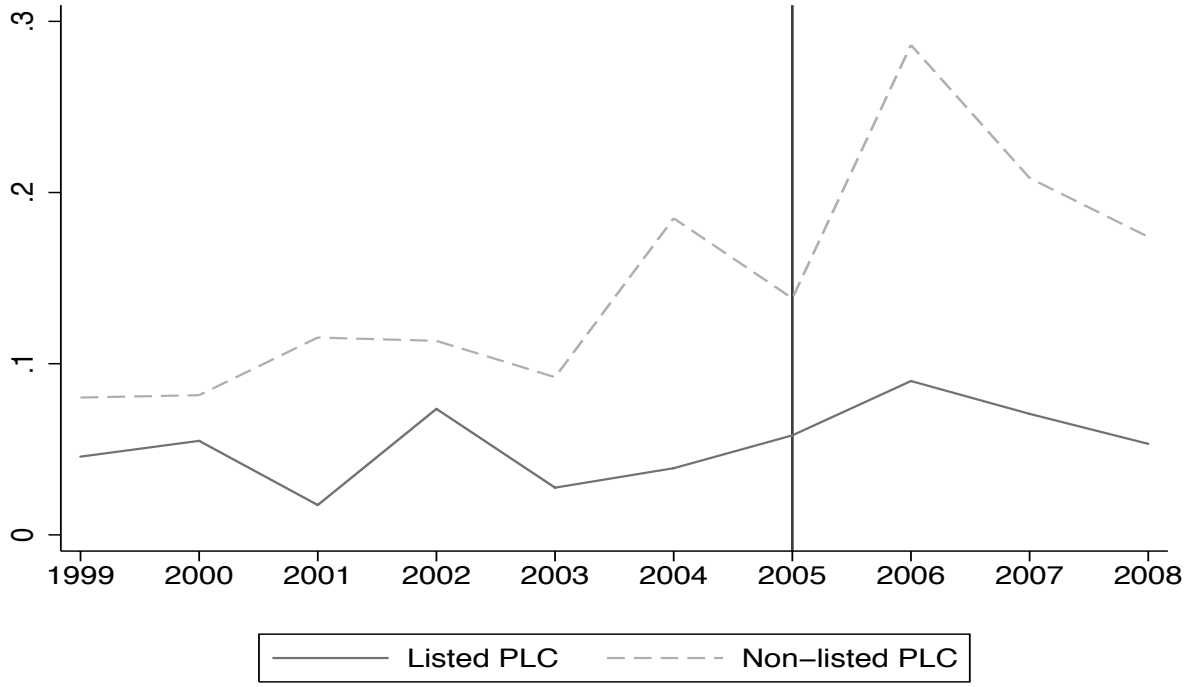
- 1^{st} **July 2005**: The passing of the voluntary deadline for compliance generated massive media attention on gender diversity, and public debate on the law in Norway. A business daily ("Finansavisen") establishes a free online database that lists the gender composition in each PLC board. The public debate centered on whether a quota should be made mandatory by law at all, and, if so, what sanctions should be put in place.
- 9^{th} **December 2005**: The government decides to put the new law into effect. Prior to this date, the law had no mandate nor any specified associated sanction. The government opted for forced liquidation as the sanction for non-compliance. This is surprising. Just a few days earlier the Prime Minister made a public statement where he specifically stated that the government would most likely associate fines with the law, if mandated ("Verdens Gang", 1^{st} December 2005).
- 1^{st} **January 2006**: All PLCs registered after this date had to comply with the quota immediately. Existing firms are given two years to comply.
- 1^{st} **January 2008**: Final deadline. 77 PLC are in not in compliance with the law. These receive a letter from the Norwegian Business Register informing them to comply by February 2008. 12 of these firms had still not made the necessary arrangements by that deadline, and were given a final warning to comply or be dissolved.
- **April 2008**: All PLCs are in compliance, and no firm was forced to liquidate for failing to meet the quota.

FIGURE 1: HISTOGRAM OF THE INFORMATION INDEX



Notes: The figure reports the distribution of the information index, defined in equation (1).

FIGURE 2: CONVERSION FROM PLC TO LTD



Notes: The figure plots the conversion rate for listed and non-listed PLCs, separately. A converting firm is one that is registered as a PLC in the current year, but is no longer registered as a PLC the subsequent year. This conversion decision is then cleaned for firms that in the current or subsequent year are no longer registered as active, are bankrupt, or do not report sales revenue (accounting data available up to 2008). Converting firms therefore include firms that convert due to mergers and acqusition activity. Such activity is not likely to be systematically related to the share of female directors.

Table 1: Director characteristics, all Norwegian PLCs, 1999-2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Firms that did or did not comply with the gender quota, percentage											
Comply	2.1	2.2	3.8	5.3	7.2	10.6	20.1	40.4	80.3	97.8	98.3
Not comply	97.9	97.8	96.2	94.7	92.8	89.4	79.9	59.6	19.7	2.2	1.7
Directors (owner representative), percentage by gender											
Men	96.8	96.5	96.0	94.9	93.2	90.7	84.5	76.8	64.3	59.3	59.2
Women	3.2	3.5	4.0	5.1	6.8	9.3	15.5	23.2	35.7	40.7	40.8
Average number of PLC directorships per person (owner representative), separately by gender											
Men	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2
Women	1.2	1.2	1.1	1.2	1.3	1.2	1.2	1.3	1.3	1.3	1.3
Foreign directors (owner representative), percentage separately by gender											
Men	13.1	14.9	14.0	13.5	13.3	14.3	15.0	16.2	14.9	15.7	15.1
Women	4.7	7.3	6.9	8.8	11.7	12.4	9.9	12.7	11.1	12.8	13.0
Average age of directors (owner representative), separately by gender											
Men	48.8	48.4	48.5	49.3	49.9	50.4	50.6	50.8	51.7	52.8	53.4
Women	45.2	44.5	45.7	46.0	47.0	46.4	45.3	44.9	45.6	46.2	47.1
Directors (employee representative), percentage by gender											
Men	81.5	83.1	80.3	79.1	77.5	74.7	73.2	73.2	69.1	67.3	74.0
Women	18.5	16.9	19.7	20.9	22.5	25.3	26.8	26.8	30.9	32.7	26.0
Chair of the board, percentage by gender											
Men	97.9	99.0	98.7	98.5	97.3	97.5	97.6	97.0	95.0	93.2	93.0
Women	2.1	1.0	1.3	1.5	2.7	2.5	2.4	3.0	5.0	6.8	7.0
Dir. (Owner)	2,484	2,833	2,945	2,797	2,575	2,413	2,333	2,401	2,250	1,945	1,677
Dir. (All)	2,762	3,099	3,199	3,064	2,834	2,673	2,585	2,637	2,492	2,187	1,907
Firms	524	602	630	600	553	521	493	505	483	414	360

Notes: The table reports director characteristics based on all PLCs registered in Norway 31^{th} December each year from 1999 to 2009. Dir. (Owner) counts the number of directorships representing owners, Dir. (All) counts all directorships, and the difference between the two gives the number directorships representing employees.

Table 2: Average cumulative abnormal return

	Return windows				
	(-1,+1)	(-2,+2)	(-3,+3)	(-4,+4)	(-5,+5)
Panel A: All firms					
ACAR	0.008	0.012	0.016	0.020	0.016
Ordinary test stat.	(3.311)	(4.998)	(7.029)	(8.528)	(6.954)
Ordinary cross sectional test stat.	(2.029)	(2.243)	(2.912)	(3.096)	(2.193)
Ratio positive CAR	0.477	0.490	0.569	0.582	0.536
Sign test stat.	(0.566)	(0.243)	(1.698)	(2.021)	(0.889)
Firms/Observations	153	153	153	153	153
Panel B: Firms with low information asymmetry and few female directors					
ACAR	0.033	0.049	0.057	0.077	0.072
Ordinary test stat.	(5.100)	(7.634)	(8.917)	(11.916)	(11.182)
Ordinary cross sectional test stat.	(1.936)	(2.921)	(2.537)	(3.515)	(3.248)
Ratio positive CAR	0.619	0.714	0.619	0.762	0.667
Sign test stat.	(1.091)	(1.964)	(1.091)	(2.400)	(1.528)
Firms/Observations	21	21	21	21	21
Panel C: Firms with low information asymmetry and many female directors					
ACAR	0.003	0.008	0.007	0.005	-0.002
Ordinary test stat.	(0.850)	(1.943)	(1.706)	(1.188)	(-0.527)
Ordinary cross sectional test stat.	(0.703)	(1.181)	(0.904)	(0.567)	(-0.156)
Ratio positive CAR	0.455	0.491	0.582	0.527	0.436
Sign test stat.	(0.674)	(0.135)	(1.214)	(0.405)	(0.944)
Firms/Observations	55	55	55	55	55
Panel D: Firms with high information asymmetry and few female directors					
ACAR	0.008	0.012	0.018	0.026	0.021
Ordinary test stat.	(1.327)	(2.054)	(3.032)	(4.318)	(3.477)
Ordinary cross sectional test stat.	(0.826)	(0.863)	(1.305)	(1.745)	(1.435)
Ratio positive CAR	0.448	0.448	0.552	0.552	0.586
Sign test stat.	(0.557)	(0.557)	(0.557)	(0.557)	(0.928)
Firms/Observations	29	29	29	29	29
Panel E: Firms with high information asymmetry and many female directors					
ACAR	0.010	0.017	0.021	0.014	0.012
Ordinary test stat.	(2.391)	(4.069)	(5.159)	(3.441)	(3.007)
Ordinary cross sectional test stat.	(1.945)	(2.000)	(2.449)	(0.923)	(0.813)
Ratio positive CAR	0.543	0.486	0.600	0.629	0.571
Sign test stat.	(0.507)	(0.169)	(1.183)	(1.521)	(0.845)
Firms/Observations	35	35	35	35	35

Notes: The table reports the average CAR for all listed PLCs. See Table 3 for details on the CAR estimation, and information asymmetry and female director classifications. All ACARs are tested if significantly different from zero using tests outlined in Boehmer, Masumeci and Poulsen (1991). Results are similar for ordinary and standardized test statistics; I report only the ordinary test statistics. All test statistics assume that the null distribution is standard normal.

Table 3: Regressions with cumulative abnormal return

	Return windows				
	(-1,+1)	(-2,+2)	(-3,+3)	(-4,+4)	(-5,+5)
Panel A: Firms with low information asymmetry					
Few female directors	0.027*	0.042**	0.052**	0.072***	0.070***
	(0.016)	(0.019)	(0.025)	(0.023)	(0.024)
Market value, logarithm	-0.002	0.007	0.009	0.010	0.003
	(0.005)	(0.006)	(0.007)	(0.007)	(0.012)
Board size	-0.001	-0.010**	-0.010	-0.010	-0.005
	(0.004)	(0.005)	(0.007)	(0.007)	(0.009)
Constant	0.038	-0.096	-0.151	-0.171	-0.035
	(0.107)	(0.119)	(0.153)	(0.148)	(0.240)
R^2	0.174	0.190	0.197	0.286	0.163
Firms/Observations	75	75	75	75	75
Panel B: Firms with high information asymmetry					
Few female directors	-0.007	-0.016	-0.013	-0.002	-0.003
	(0.012)	(0.014)	(0.014)	(0.018)	(0.019)
Market value, logarithm	-0.003	0.000	0.002	0.005	0.005
	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
Board size	-0.003	-0.007*	-0.008	-0.011*	-0.008
	(0.003)	(0.004)	(0.005)	(0.006)	(0.006)
Constant	0.094	0.035	-0.023	-0.035	-0.018
	(0.066)	(0.093)	(0.102)	(0.112)	(0.122)
R^2	0.164	0.503	0.464	0.416	0.356
Firms/Observations	64	64	64	64	64

Notes: The table reports results from cross sectional OLS regressions of CAR, separately for low and high information asymmetry firms. A high information asymmetry firm has an information index score below the median value; the remaining firms are classified as low information asymmetry firms. The event windows are centered on 9^{th} December 2005, the date when the gender quota was mandated. CAR is calculated over each of the (-1,+1), (-2,+2), (-3,+3), (-4,+4), (-5,+5) day return windows. CAR is each firm's actual stock return over the event window, net of normal return. Normal return is estimated for each firm based on the firm's daily stock return in the 250 days window (-255,-6) prior to the event window, and the MSCI World Index converted to NOK. Returns are calculated as the logarithm of the ratio of price on day t and price day $t-1$; prices are adjusted for splits/reverse splits and dividends. A stock needs 100 observations over the estimation window to enter the CAR calculation. In the case of dual listings, I use the average abnormal return over the listings for that firm. Few female directors is an indicator variable that equals to 1 if the firm has below the median share of female directors in November 2005, else zero. Board size is the total number of directors, including directors representing employees. The market value equals the close price of the firm's stock on the Oslo Stock Exchange on the last day in the estimation window multiplied by the number of shares issued. In the case of dual listings I use the aggregate market value over the listings of that firm. All regressions include indicator variables for industry sectors. Robust standard errors (Huber/White/sandwich estimator) reported in parenthesis; stars indicate significance levels: *** 1%, ** 5%, *10%.

Table 4: Summary statistics, PLCs 1999-2008

	Mean	Std. Dev.	Observations
Panel A: Listed PLC			
Conversion decision	0.054	0.226	1727
Female directors	0.185	0.185	1751
Board size	6.256	1.819	1751
Equity ratio	0.441	0.238	1704
Firm age	23	27	1712
Return on assets	-0.002	0.178	1684
Employee rep.	0.404	0.491	1751
Total assets (mill NOK)	12613	71058	1707
Market equity (mill NOK)	5734	26736	1631
Tobin Q	1.773	1.584	1597
Panel B: Non-listed PLC			
Conversion decision	0.140	0.347	3278
Female directors	0.111	0.169	3376
Board size	4.691	1.705	3376
Equity ratio	0.475	0.396	3187
Firm age	11	19	3368
Return on assets	-0.006	0.269	3082
Employee rep.	0.140	0.347	3376
Total assets (mill NOK)	4894	52020	3287

Notes: The table reports summary statistics for all PLCs over the period 1999 to 2008, separately for listed and non-listed PLCs. The conversion variable is defined in Figure 2. Female directors is the ratio of female directors representing owners relative to the total number of directors representing owners. Board size is the total number of directors, including directors representing employees. Equity ratio is equity divided by assets, both book values. Firm age is the current year minus the year of incorporation. Return on assets is calculated as earnings before interest and taxes divided by total book value of assets. The employee board representative indicator variable equals to one if the firm has at least one director representing employees, else zero. Total assets is the book value of assets. The market value of equity is the end of year close price of the firm's stock on the Oslo Stock Exchange multiplied by the number of shares issued. Tobin Q = (Book value of total assets - book value of equity + market value of equity) / Book value of total assets. The following values are excluded as outliers: Absolute value of return on assets above 100%; Tobin Q value above 20; book value equal to or below zero; equity ratio below minus 100%.

Table 5: Conversion from PLC to LTD, listed PLCs

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Female directors	-0.070	-0.036	0.100	-0.140	0.005	-0.132	-0.030	0.029	0.001	0.150
	(0.182)	(0.137)	(0.126)	(0.195)	(0.034)	(0.102)	(0.070)	(0.160)	(0.195)	(0.342)
Board size	-0.004	0.005	-0.022*	-0.041**	-0.003	-0.023	-0.016	0.015	-0.017	-0.006
	(0.011)	(0.010)	(0.013)	(0.017)	(0.003)	(0.016)	(0.011)	(0.017)	(0.015)	(0.020)
Equity ratio	0.054	0.038	-0.055	-0.270**	0.124*	0.087	-0.075	0.152	0.134	-0.126
	(0.081)	(0.051)	(0.064)	(0.134)	(0.066)	(0.122)	(0.075)	(0.136)	(0.096)	(0.092)
Firm age	0.001	-0.001	-0.001	-0.001	0.000	0.001	0.000	-0.001	-0.000	-0.001
	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Return on assets	-0.000	-0.095***	0.001	0.036	-0.182*	-0.114*	0.010	0.099	0.153	0.009
	(0.055)	(0.025)	(0.025)	(0.023)	(0.094)	(0.068)	(0.087)	(0.125)	(0.139)	(0.068)
Employee rep.	0.015	-0.050	0.069*	0.103*	0.005	0.003	0.041	-0.059	0.008	0.072
	(0.042)	(0.048)	(0.040)	(0.057)	(0.010)	(0.037)	(0.045)	(0.049)	(0.070)	(0.053)
Total assets, logarithm	-0.013	0.024	-0.015	-0.089**	0.027*	0.046	-0.012	0.100*	0.037	-0.027
	(0.020)	(0.030)	(0.023)	(0.037)	(0.016)	(0.033)	(0.024)	(0.056)	(0.031)	(0.030)
Market value, logarithm	-0.006	-0.015	0.026	0.098**	-0.028*	-0.029	0.022	-0.122*	-0.035	0.008
	(0.021)	(0.026)	(0.026)	(0.038)	(0.016)	(0.030)	(0.022)	(0.068)	(0.039)	(0.019)
Tobin Q	-0.001	0.001	-0.012	-0.094**	-0.005	0.000	-0.001	0.012	0.011	-0.074*
	(0.002)	(0.006)	(0.009)	(0.042)	(0.008)	(0.000)	(0.006)	(0.009)	(0.022)	(0.040)
Constant	0.210	-0.088	-0.003	0.352*	-0.034	-0.001	-0.046	0.115	0.056	0.353
	(0.160)	(0.121)	(0.064)	(0.211)	(0.043)	(0.111)	(0.148)	(0.196)	(0.198)	(0.293)
R^2	0.063	0.136	0.093	0.175	0.576	0.113	0.081	0.116	0.099	0.101
Firms/Observations	165	158	153	141	137	146	166	158	174	143

Notes: The table reports the results from cross sectional OLS regression of the conversion decision of PLC firms on the share of female directors in the current year. Only listed PLCs included. Variable definitions in Table 4. Outlier values (as defined in Table 4) are not excluded. Results are similar when excluding outliers. All regressions include indicator variables for industry sectors. Robust standard errors (Huber/White/sandwich estimator) reported in parenthesis; stars indicate significance levels: *** 1%, ** 5%, *10%

Table 6: Conversion from PLC to LTD, non-listed PLCs

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Female directors	-0.044	0.109	0.255	0.420	-0.072	0.224	-0.170	-0.849***	-0.537***	-0.315
	(0.134)	(0.205)	(0.218)	(0.281)	(0.119)	(0.177)	(0.133)	(0.164)	(0.179)	(0.396)
Board size	0.026*	-0.023**	-0.009	-0.017	0.021	-0.015	-0.019	-0.000	0.019	0.015
	(0.013)	(0.011)	(0.013)	(0.015)	(0.013)	(0.016)	(0.015)	(0.019)	(0.019)	(0.025)
Equity ratio	0.000	0.000	0.001***	0.000*	0.000	0.001	-0.000*	-0.036	-0.037	-0.091
	(0.001)	(0.003)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.057)	(0.053)	(0.088)
Firm age	-0.001*	0.000	-0.000	0.001	0.001	-0.000	-0.001	0.000	0.002*	-0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Return on assets	0.003	-0.006	-0.021	-0.012***	-0.000	-0.025	0.009**	0.016	0.040	-0.017
	(0.006)	(0.012)	(0.016)	(0.001)	(0.001)	(0.018)	(0.004)	(0.022)	(0.030)	(0.038)
Employee rep.	0.087	0.030	-0.058	-0.038	-0.077	0.015	0.017	0.037	-0.121	0.046
	(0.064)	(0.052)	(0.062)	(0.065)	(0.060)	(0.078)	(0.069)	(0.090)	(0.082)	(0.107)
Total assets, logarithm	-0.014*	-0.005	-0.014	-0.003	-0.022**	0.005	0.009	-0.012	-0.039***	-0.028**
	(0.008)	(0.011)	(0.012)	(0.014)	(0.010)	(0.011)	(0.010)	(0.011)	(0.012)	(0.014)
Constant	0.034	0.156	0.181	0.011	0.160	-0.002	-0.054	0.817***	0.605***	0.349**
	(0.078)	(0.135)	(0.135)	(0.121)	(0.103)	(0.117)	(0.092)	(0.261)	(0.143)	(0.172)
R^2	0.052	0.033	0.152	0.083	0.082	0.095	0.086	0.174	0.152	0.110
Firms/Observations	317	268	274	250	344	331	275	289	259	178

Notes: The table repeats the regressions of Table 5 for non-listed PLCs only, which excludes the variables market value and Tobin Q. Robust standard errors (Huber/White/sandwich estimator) reported in parenthesis; stars indicate significance levels: *** 1%, ** 5%, *10%

Table 7: Change in return on assets, 2004 - 2008

	First stage	△ ROA	
	(1)	(2)	(3)
Dummy = 1 if firm did not comply with quota in 2004	0.264***		
	(0.028)		
△ Female directors (predicted values)		0.054	-0.242
		(0.191)	(0.266)
△ Female directors (predicted values) × Information index			0.595*
			(0.343)
Board size	-0.006	-0.012	-0.010
	(0.008)	(0.011)	(0.013)
Equity ratio	-0.220***	0.057	0.058
	(0.077)	(0.122)	(0.133)
Firm age	-0.000	-0.000	-0.000
	(0.000)	(0.001)	(0.001)
Employee rep.	0.029	-0.033	-0.053
	(0.034)	(0.042)	(0.042)
Total assets, logarithm	-0.038	0.042	0.050
	(0.028)	(0.036)	(0.037)
Market value, logarithm	0.034	-0.035	-0.052
	(0.029)	(0.038)	(0.040)
Tobin Q	-0.002	0.010	0.017
	(0.009)	(0.016)	(0.017)
Constant	0.300***	-0.123	0.315**
	(0.099)	(0.206)	(0.150)
R^2	0.587	0.082	0.148
Firms/Observations	101	97	88

Notes: The table reports estimates from regressing the change in return on assets ($\triangle ROA$) from 2004 to 2008 on the change in the share of female directors over the same period. Only firms listed in both 2004 and 2008 are therefore included. Each column represents estimates from a single regression. Variable definitions in Table 4. Column 1 reports the results from the first stage, where I regress changes in the share of female directors on a dummy variable that equals to 1 if the firm did not comply with the quota in 2004, and other variables. The second stage (Column 2 and 3) uses the fitted changes in the share of female directors from the first stage as an explanatory variable. The information index is defined in equation (1). All regressions include indicator variables for industry sectors. Outlier values (as defined in Table 4) are excluded. Robust standard errors (Huber/White/sandwich estimator) reported in parenthesis; stars indicate significance levels: *** 1%, ** 5%, *10%.

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